

Lean Supply Chain Management: a lean approach applied to distribution - a literature review of the concepts, challenges and trends

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Abstract: Developed between 1948 and 1975, the Toyota Production System (TPS) has in its essence increasing profitability through the elimination of losses. The TPS continued to evolve, becoming better known as just-in-time (JIT) production and, in the sequence, as lean production or lean thinking. In this line, the lean philosophy and its concepts were extended to manufacturing industries over the years. However, up to the present, the challenge for many companies lies in how to reduce the gap in the application of these concepts to their distribution operations process. The distribution operation is responsible for the success of customer services and, at the same time, it works under intense pressure to reduce costs and inventory, keeping the high service level. The purpose of this paper is to present a literature review about distribution related to the lean concept, and it aims to provide an overview of recent ideas, challenges, and trends to implement the lean distribution. The research is supported by Scopus database articles published in English; it has been limited to a period, from 2007 to 2017. As a summary conclusion, it is imperative that the implementation of a lean distribution program considers the supply chain management (SCM) as a system and does not apply the lean practices to isolated parts of the chain.

Keywords: Lean distribution, Lean logistics, Lean manufacturing, Lean supply chain, Supply chain management.

1. Introduction

Currently, the planning and the process aim to optimize the production on pursuing customer satisfaction, through excellent customer orientation and operational excellence. The distribution operations are susceptible to the global trends and can be impacted in cost and performance due to the direct connection with the customer service. The lean approach improves the flexibility and simplicity by reducing dependence on forecasts and offering more optimized plans to achieve better results in the supply chain management (SCM) performance. In this environment, the distribution operation tends to be an indicator of the accuracy of the forecasts. An unbalanced inventory and a frequent fluctuation are visible in a distribution center where the shortages or excesses are usually attributed to inaccurate previsions. The success of a forecast can be measured by distribution service level, inventory health, costs and allocated resources, and the achievement of these distribution indicators is related to the planning process and limited by the efficacy of the forecast (Zylstra, 2005).

Even being efficient, the SCM often becomes uncompetitive because it does not adapt to changes in the structures of markets. SCM efficiency is necessary, but it is not enough to ensure that firms will do better than their rivals (Lee, 2004). The focus of SCM practices must shift from functional and independent to general and integrative initiatives (Frazzon et al., 2015; Theagarajan and Manohar, 2015). Based on this study and in a comparison of the publications researched, it was observed that a number of companies do not understand the lean philosophy and its concepts; therefore this is one of the main reasons for failures when it is applied to the distribution operation. Taking this scenario into account, an opportunity to develop this review has been identified, and the purpose of this paper is to present a literature review about distribution related to the lean concept, and it aims to provide an overview of recent ideas, challenges, and trends to implement the lean distribution (LD).

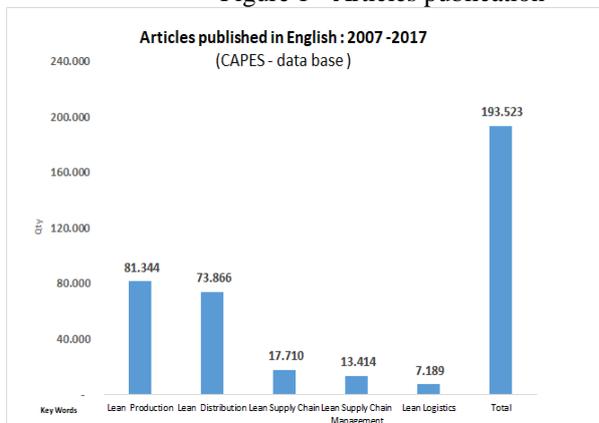
If considered, managers would be able to have a clearer idea and a better perception of the elements that need to be improved by filling the gaps and knowing where the leaders need to focus. It should be observed that most companies do not obtain results with lean philosophy due to the lack of understanding on how the kit of tools work together, in a synergistic way for the construction of lean system (Sturdevant, 2014). The benefits of lean principles can motivated managers and professionals thinking about expanding lean philosophies to the entire supply chain (Berger, Yokoyama and Rodriguez, 2018).

It proposes to analyze the literature, within a limited period – from 2007 to 2017, presenting a revision of distribution operations within the lean philosophy. This paper is structured in three sections, beyond this introduction. The section 2 presents the research methodology used in the construction of the work. The section 3 introduces the theoretical literature as the base of concepts for lean distribution, aligned with the most important publications, analysis and abstracts, comments and the summary of ideas by the referenced authors. Finally, the section 4 brings the conclusions and recommendations from the authors.

2. Methodological Approach

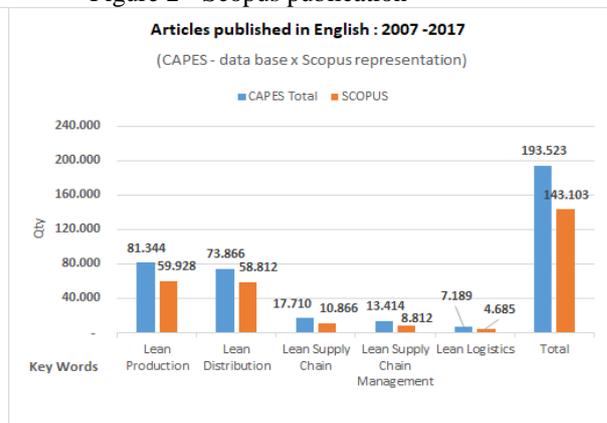
This section presents the research methodology used to construct this paper, regarding the literature review related to lean concept applied into SCM. The methodological approach of this research is characterized as exploratory, documentary and descriptive (Gil, 2008), and the authors used bibliographic references and sampling as instruments to execute the study, accessing a public journal portal (CAPES), in connection with other publications. After defining the keywords lean distribution, lean logistics, lean production , lean supply chain and lean supply chain management, a total of 193.523 articles in English language, on the portal CAPES were found. A significant result from this analysis was the total number of articles per database, this being a parameter that supports the outlining of the collection chosen in the research, where Scopus represented significant 74% of the publications from the period between 2007 and 2017.

Figure 1 - Articles publication



Source: CAPES (2018).

Figure 2 - Scopus publication

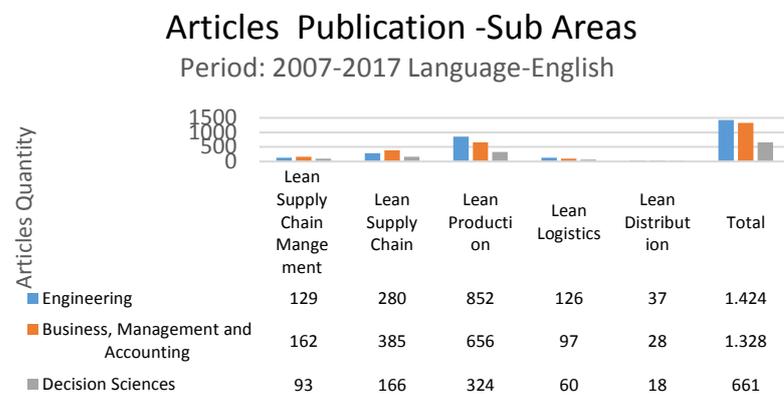


Source: CAPES (2018).

In order to continuing the analysis, the first phase consisted in the search for the keywords in the articles written in English, from the previously referred period, regarding the

areas of Engineering, Business Management, Accounting and Decision Sciences. In the second phase, the main topics, which approximated the article contents to the subject of the research, were found. The third phase worked on the database definition. During the fourth stage, the articles were selected, based on the number of citations, classification, and alignment with the research objective. In the fifth stage, the journals presented in the production of the article were identified. In the last phase, the tabulation and evaluation were executed, with the major results being presented and discussed. At this time, the keywords and the main topics were inputted to approximate the content of the articles to the research proposal as shown in Figure 3.

Figure 3 - Article publication by subject areas



Source: Scopus (2018).

In order to achieve the aim of this paper, the bibliometrics of previously selected 3.413 articles was carried out. As results, by eliminating duplications, reading the keywords and titles, identifying alignment with the research objectives, the highest number of citations, classification and reading the abstract or the article content, 30 articles were pre-select from this total.

3. Literature Review

3.1 Lean logistics

Lean Thinking is a philosophy of management and/or business strategy that objective of streamlining the flow of production (Womack and Jones, 2003), while seeking to reduce costs through a system of identification and elimination of waste, making the customer receive

exactly what he need, at the requested time and in the quantity requested (Ferreira, 2017). The analysis of the concepts and principles of the lean mentality should always precede the choice of management tools since the concepts dictate the behavior of the system. Concepts knowledge are relevant in decision making and determination of appropriate tools. Operating with smaller stocks, greater flexibility and better customer service - all at the same time - requires a very coherent logic, and often surprising for its simplicity. Unlike the traditional SCM, which has excessive inventory and tolerates many inefficiencies, the lean culture is to maximize flow value, to reduce waste and loss (Guimarães and Rodriguez, 2018). Simplicity is a fundamental part of Lean Logistics, but in many cases, it would not be possible to apply it. In other cases, to simplify it, it is necessary to adopt a different way of thinking - which may represent a break with the dominant paradigms (Bañolas, 2006).

Ohno (1988) defined seven common forms of waste, activities that add cost but no value: production of goods not yet ordered; waiting; rectification of mistakes; excessive processing; excessive movement; excessive transport; and excessive stock. It is common to find that, in fact, in a factory, less than 5% of activities add value, 35% are, necessarily, non-value-added activities and 60% add no value at all. It is easy to see the steps that add value, but it is much more difficult to see all the waste that surrounds them. Optimizing each piece of the supply chain in isolation does not lead to the lowest-cost solution. On the contrary, it is necessary to look at the whole sequence of lean events, from the customer's order right back to the order given to the raw materials producer, and forward through all successive companies making and delivering the product to the customer.

In trying to identify possibilities for eliminating waste, this makes more sense if it is done for one particular product or product family, and for all the tributaries that flow into this stream of value creation. Focusing on the whole chain is the first step; focusing on the product is the second and focusing on the flow of value creation, and not on the more traditional performance measurement of departments and enterprises, is the third; this is called "value stream" – a new and more useful unit of analysis than the supply chain or the individual firm. The focus on the flow of value creation challenges immediately the notion that batches are necessary and better (Jones, Hines and Rich, 1997).

Lean thinking concepts can be used in all areas of business. The most prominent intersection can be seen between the logistics and the production area (Bednár, Vidová and

Beluský, 2012). The usage of the fundamental concepts of lean manufacturing techniques – listed below – can be usable in the logistics system:

- a) Specifying the value of products (products and services) from the customer's point of view: the value specification typically begins with the identification of customers. People should develop and understand their needs and desires concerning products, results, benefits, and services.
- b) Customers define value: identifying the value chain for each product (products and services) and removing the waste; mapping the tasks of the organization in such a way as to allow people to view processes, including activities that are efficient and those that are "Wasteful".
- c) Lean analysis groups activities into three categories: activities that add value; activities that do not add value, but are necessary; activities that do not add value - unnecessary.
- d) Making value flow through the chain: after the "wasteful" activities have been identified, the remaining ones are coordinated so that the inputs and outputs flow between the process steps. That requires a focus on the needs of the object flowing in the process (products, results, benefits, and services) and should not be influenced by the existing infrastructure or organizations.
- e) Customers can pull the creation of value in the chain: an organization should not do something until that is necessary, so do without a lead time. Nothing is done at a stage of the process without knowing what the client of the next step whether and when it wants.

The features of lean logistics are:

- a) Customer demand-oriented: in the lean logistics system, customer demands are the motivation of production and starting point of value; systematic production is pulled by customer demands.
- b) Timely, accurate and fast: timely means the material is completed on time in each stage of the flow; accurate means accurate information and communication, accurate storage, accurate prediction of customer demands and accurate shipping

quantity; quickly indicates the response speed of customer demands and transmitting speed of cargo in the logistics system.

- c) Cut down costs and raise efficiency: lean logistics system ensures the low cost and high efficiency by reasonable resource allocation.
- d) Systematic integration: a lean system needs a better allocation of the resources, including facility and equipment sharing, information sharing and benefit sharing.
- e) Informatization: modern logistics service is a complicated systematic project; thus the electronic information is convenient for transmitting, saving and computing that can prompt the information flow fast, accurate and ensures logistics service timely, highly-efficient. Informatization is the core and guarantee of lean logistics.

3.1.1 Case study analysis

Focused on material flow and working in process (WIP) in an automobilist production process environment, the scheme proposed by Zhao e Ning (2009) offers a lean operational model. Analyzing the proposal, the model has flexible production lines where the configuration arrangement presents flexible lines that allow producing different types of vehicles in the same assembly line, using the production order pattern, answering the dynamic marketing demand. The supply chain can use just-in-time (JIT) production standard process aligned with zero inventory metric, where the transit inventory corresponds to the existing material and the volume needed in the warehouse. The manufacturing company needs only to set a re-distribution center operations management in order to keep the reduced safety stock near to the production line.

The use of Research Institution & Faculty Development (RIFD) technology, matched with management fundamental concepts and methodologies as JIT, Enterprise Resource Planning (ERP), E-commerce, and others, in the model proposed by Zhao and Ning (2009), reflect the operation and control systems of lean logistics in an automotive manufacturing business. The tracking of a collection is supported by RFID in real-time information. According to the author, the application of the system can adequately compensate the shortage of ERP and other systems regarding the real-time collection, data accuracy and real-time input of material and product data, promoting the realization of JIT production pattern of manufacturing companies.

In this system through establishing the logistics information management system of the Internet-based automobile parts, and by visiting websites of related companies, the manufacturer can obtain the information of the demands about the associated automobiles parts directly. The information about transportation, cargo tracking, inventory, and order management status, planning-making can also be found.

According to its provision of information about accurate real-time status of the parts, quantity and the real-time data which is collected at the scene of the production, with the use of RFID system in the Auto manufacturing companies, so the Auto manufacturing companies that are making the pull-production plan have a reliable source of information. By visiting the websites of the auto manufacturing companies, the automobile suppliers are able to know the real-time dynamic demands in the production line. Then, the production can be arranged reasonably. It will provide the manufacturers with the parts which meet the accuracy of the requirements. By doing this, the waste can be eliminated, the producing efficiency and quality can be improved, and the costs can be cut down (Zhao and Ning, 2009).

Each material provided by the suppliers is affixed with RFID tags which contain a unique electronic production code. When the labeled materials are taken out of the factories, the information about them will be stored in the database through the RFID reader. It can realize the inventory management, and the information-sharing in the whole range of the supply chain is provided at the same time.

By accessing the relevant information, the third party logistics company can not only make distribution plan arrangement reasonably and timely but also supervise the transportation by utilizing of the RFID system and get the real-time situation of distribution. In this way, they can avoid repetition of distribution, cut down the transportation time, reduce the total logistics costs and improve their competitive forces. Also, the ERP system can send and share the demand signal on time, asserting and balancing the market demand. Logistics system, combined with lean thinking (LT), becomes lean logistics, which means the upper suppliers provide right logistics service with the right price, on the right time, in the right place, to satisfy the personalized demands of the customers (Zhao and Ning, 2009).

3.2 *Supply chain management*

SCM aims the integration of key business processes, from the end user to those who provide products, services, and information to enable the creation of value for customers and stakeholders (Cooper, Lambert and Pagh, 1997). Simchi-Levi, Kaminsky, and Simchi-Levi (2003), define SCM as “a set of approaches utilized to integrate suppliers, manufacturers warehouses, and stores efficiently, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements”.

SCM is the dynamic administration of supply activities to maximize client value and accomplish an economic upper hand. It includes the management of product development, sourcing, production, and coordination of supply. Supply chains are "connected" through physical streams and data streams (Yi-Tao, 2010; Sun et al., 2011).

The council of supply chain management professionals (CSCMP) asserts that SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management within and across companies. Sometimes the SCM can be confused with the term “logistics management”, and as follows, it is presented the definition published by CSCMP (2018): “Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.”.

The strategy used in the SCM to achieve a better performance of suppliers is based on the implementation of programs that aim to transmit knowledge gained with the use of lean manufacturing practices. For example, the application of lean manufacturing practices in the supply chain allows the organizations to achieve higher reliability, a sharp reduction in inventories. Regarding inventories management, in the traditional business model, the inventory rotation usually is on 3 to 5 times, and in a company that uses and applies the lean concepts, the turnover can achieve 20 times per month.

3.3 *Lean distribution*

Global SCM is the management of the supply chains physically far from each other. SC consists of suppliers, the factory, the vendor, the distribution channels and mainly the customers. The channel starts the demand orientation to the plant, then the production of products, procurement, logistics and distribution to the customer. Enterprises plan, evaluate, improve and optimize their SC to grow over a period. These results of these actions converge to cost reduction, improve the delivery speed and enhance customer satisfaction. In this dynamic scenario, the distribution operation plays a key role in the SCM process, where the operation needs to be effective and efficient managing resources as transportation to connect goods and customers. It enhances inventory turnover development.

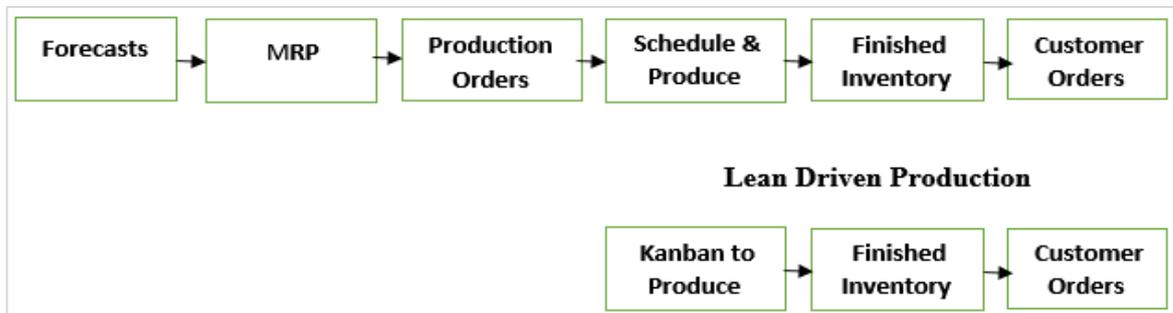
To Pérez et al. (2010), implementing lean supply chains has four main obstacles to overcome: (a) current “trading” strategies based on fluctuating auction prices; (b) difficulty to add value in formation of stream teams; (c) senior management commitment and support; and (d) existing adversarial power-based relationships with customers and suppliers.

In this context, the questions raised by this paper are:

- a) What are the main challenges for the distribution nowadays? The operations are changing from the historical role resumed to storage and shipping point. Some organizations are working with a virtual warehouse, where there is a logical location that receives and ships the goods as a hub; for instance, the factories send the goods to one specific shipping point where they are consolidated and shipped to the customer as one unique solution, without inventory allocation. In addition that, in a multi-level organization, a lean implementation process is not easy, and sometimes inapplicable.
- b) What are the challenges to improve lean distribution and logistics operations? The challenges identified are freight cost, customers’ requirements, forecast accuracy, labor costs, quality, and planning process.

The lean practices for distribution are: reducing the set time that causes large batches; linking use (demand) with production (Kanban), improving material flow, cells and material handling; and improving quality: consistent output. This process is represented in Figure 4.

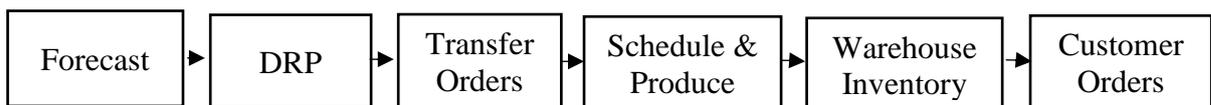
Figure 4 - MRP driven distribution planning



Source: Zylstra (2005).

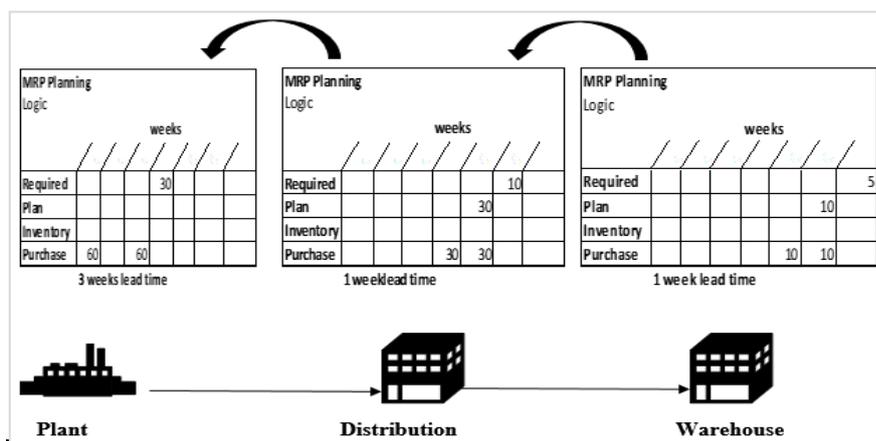
The Figure 5 depicts a summarized Distribution Requirements Planning (DRP). The Figure 6 shows the Materials Requirements Planning (MRP) flow.

Figure 5 - Flow DRP planning process



Source: Zylstra (2005).

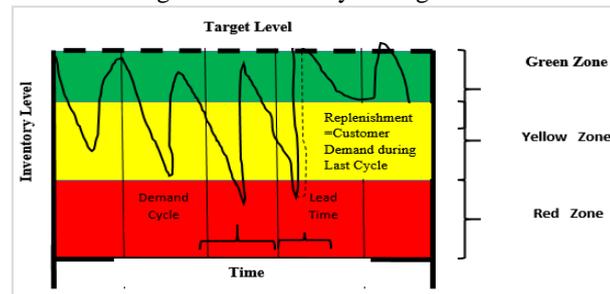
Figure 6 - MRP flow



Source: Zylstra (2005).

Inventory management is represented in Figure 7.

Figure 7 - Inventory management



Source: Zylstra (2005).

In this paper about the distribution process the researchers highlighted some of the results detected:

- a) The sales forecasts are only accurate when elaborated in an aggregate way, and over more extended periods of time.
- b) The inventory costs are typically understated.
- c) Re-planning, according to forecasts changes, takes time and effort, but the warehouse and DC managers need to protect their customer service level, and they do not practice this re-planning.
- d) Customer service policies are well documented or formalized, but on the other hand, an inventory close to the customer and in large quantities is considered good for the service, so some companies do not follow the policies.
- e) Minimizing transportation (in isolation) can be a faulty objective; in this case, the companies do not do this because ERP system and process built around the DRP model.
- f) High inventories may not equal responsiveness, where total cost view is difficult to obtain.

Considering lean distribution distinct from lean production, the key difficulty is to define the boundaries of the subsystem in question. To Womack and Jones (1996), and Hines, Holweg and Rich (2004), the philosophy is centered on maximizing the value and reducing waste and cost. The lean distribution can be defined as reducing the waste in the downstream supply chain and delivering the right product on time to the customer at the right place. Aligned with Toyota Production System (TPS) and lean thinking, this performance can be better achieved when the products are pulled by the market rather than pushed towards it. That is a

simple JIT concept that can improve the inventory performance avoiding over inventory in transit, along with the distribution process.

Towill and Cristopher (2002) recommend that the lean (for example inventory-based in distribution) and agile (responsive distribution for instance) concepts can be integrated in a combined supply chain strategy; in a scenario where it is possible to separate the chain configuration, splitting it in one first “lean” plant which manufactures a determined product, and another second “agile” plant which manufactures a different product. The configuration can also be separated by time, where one plant produces one product for the summer, and the other, a kind of product for the winter (fashion segment for example). Up to now, the lean SCM full implementation achievement can be considered an exception within the inefficient value chain. On the other hand, the implementation of lean distribution without considering the SCM as one system may not support the process successfully. The savings achieved in the distribution must be weighed across the other parts of the chain as manufacturing. It will need a balance of benefits and impacts into the system (Reichhart and Holweg, 2007).

3.4 Main authors approach about lean practices implementation

After the research was done, seven authors were selected for having been considered more in accordance to the proposal of this work – a more in-depth analysis of lean practices implementation. For this more detailed analysis, an exception was made for some articles of the period from 2007 to 2017, because they were considered classic articles and could not be left out of the analysis. It should be noted that, eventually, the articles addressed more than one of the concepts; however, they were classified according to the emphasis given.

Table 1 – Resume: main authors approach and conclusions about lean practices implementation

Author	Approach	Conclusion
Zylstra (2005)	Many organizations have implemented Lean Practices, however the major without success. The extension of these Lean principles to the Distribution is a big challenge	In order to achieve the results in the lean distribution implementation is imperative to consider the SCM as one system and not applied the Lean practices in isolated parts of the chain.
Reichhart and Holweg (2017)	In general firms find it difficult to extended Lean principles downstream into their Distribution System.	Lean thinking has been widely applied across manufacturing in many industry sectors, with high performance improvements. However, when extended to lean distribution were not reported these same good results. In general, the manufacturing focus and market focus are not linked.
Villareal et al. (2012)	In this study, the LM approach for waste elimination is applied to improve the SC in order to achieve the high level of chain efficiency.	The main objective of the study was to extend the OEE concepts to each facility to the SCM. As part of Distribution process, the focus was in the warehouse and transportation activities working synchronized into the chain as part of the system and not as separated activities.
Jasti and Kodali (2015)	In this current era of global competitiveness, not only the manufacturing organizations are facing enormous pressure from their customers and competitors but it is a challenge for other industries too. All these factors have given way to integrate the LP concept with the complete production process (starting from the suppliers to the delivery to the customer). This has given rise to the concept of 'Lean enterprise (LE)' LE does not restrict to organization but it extends beyond their limits.	It was observed that the empirical approach articles (53.3%) in LSC stream have dominated compared to the conceptual approach articles (46.7%). It is a good signal and a clear indication that lean principles have been applied successfully in SCM activities
Jayaram (2016)	Lean Six Sigma, when applied to the Global Supply Chain, eliminates unnecessary processes as well as defects in the produced goods which increases the overall efficiency of the global supply chain. Industry 4.0 and IoT helps to improve the efficiency of production and supply by automation and exchange of data between the manufacturing and logistics systems. It helps in faster, efficient and systematic management of supply chain management activities globally	The enterprise can optimize the activities by reducing costs and increase value of the goods which are delivered to the customer. It helps to stay ahead in the competition and focuses on gaining customers and profits. In the future all enterprises will have a smart factory for quick and more efficient production as well as smart logistics for speedy delivery and distribution of goods.
Frazzon et al. (2017)	Due to an increasing competitive pressure for shorter lead times, lower costs and better quality, the principles of lean manufacturing have been incorporated into the supply chain integrative approaches (Cudney and Elrod, 2010).	Managers must be aware that if certain levels of production stability are not in place, a more conservative approach must be used with regards to lean SCM practices. However, once these stability issues are mitigated, wider benefits can be obtained from the adoption of these inventory strategies.
Tortorella et al. (2017)	Supplier and customer integration emerges as an important element to improve competitiveness beyond the organizational boundaries (Flynn et al., 2010; Frazzon et al., 2015). This concept is perfectly aligned	Regarding companies' background on LM implementation, results indicate that companies have been approaching shop floor improvements disconnectedly from supply chain context. In fact, this outcome highlights

Author	Approach	Conclusion
	with classical supply chain management (SCM) definitions, since it comprises the flow of goods from supplier through manufacturing and distribution chains until the end user (Power, 2005). In this sense, the focus of SCM practices must shift from functional and independent to general and integrative initiatives (Theagarajan and Manohar, 2015).	that managers (especially from Brazilian companies) are still focusing their continuous improvement efforts on internal issues and the elimination of waste is treated from a narrow perspective. This finding alerts managers that they might be disregarding or neglecting the potential benefits arising from an extended value stream approach.

Source: Authors.

As a summarized conclusion of Table 1, the authors of this paper highlight that, according to the referenced authors, organizations still focus their continuous improvement efforts on:

- a) Internal isolated matters as part of the chain (inventory, manufacture, and transportation);
- b) The elimination of waste, which is addressed from a limited view, wholly disconnected from the supply chain context, not considering the potential results and benefits from extended lean SCM practices.

4. Conclusion

This paper worked on the application of the lean thinking concept in the activity of distribution operations as a crucial process in the SCM. The chief purpose of this study was to present a literature review about distribution related to the lean concept, and it aims to provide an overview of recent ideas, challenges, and trends to implement the lean distribution. A frame time, from 2007 to 2017, was established. Supported by Scopus, using documents published in English, this study aims to provide an overview of lean distribution concepts, challenges, and trends. As primary results of the research, it is possible to say that the majority of the organizations have been approaching manufacturing improvement disconnected from the SCM context, consequently, from lean distribution.

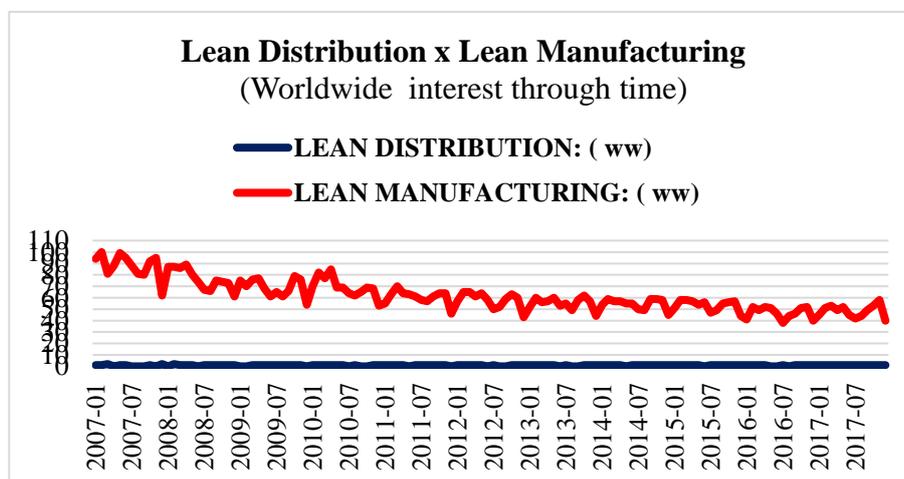
For some authors, lean manufacturing concepts, when applied to lean distribution, can generate some conflicts. The main reason for these conflicts is that each area has its proper focus, for example, manufacturing is focused on operational cost while marketing and sales are focused on revenue. Moreover, some general management concepts also need to be changed, for instance: having an inventory close to the customer and in large quantities is considered

good for the service; warehouse and DC managers need to preserve their customer service levels.

As a second objective – providing an overview of recent challenges for implementing lean distribution – the finding attests that the challenges identified to improve lean distribution in logistics operations are freight cost, customers' requirements, forecast accuracy, labor costs, quality, and planning process.

The third objective addresses to trends to implement the lean distribution. The trends of lean manufacturing (LM) stream articles have been continuously increasing from the year 2007 onwards. It clearly indicates the success of LM principles in the organizations as well as benefits received in all industry sectors due to the implementation of lean principles (Jasti & Kodali, 2015). The worldwide interest for the lean distribution principles into the Logistics and Transportation area deserve attention and show a significant opportunity to be explored from studies and applications perspectives. Figure 8 shows the worldwide interest in lean distribution and lean manufacturing areas.

Figure 8 - Lean distribution x lean manufacturing worldwide interest



Source: authored using Google Trends (2018).

The acceptance of improvement philosophies and a lean culture generates opportunities to improve the quality and service of different sectors included distribution. However, these methods are difficult to apply in these sectors given the volatility of demand and a high degree of human participation. Alongside this scenario, this trend was only possible with the technological evolution that was accentuated in the last quarter of the 20th century. Nowadays,

with all the technology available and future resources, allied to the new concepts as Elastic Logistics, for example, this trend to implement the lean distribution process will be reinforced.

Based on Jastia and Kodali (2015), we conclude that for the implementation of a lean distribution program it is imperative to consider the SCM as a system, and not to apply the lean practices only to isolated parts of the chain.

As a recommendation, the authors of this paper suggest continuing this research, investigating with more details on the subject of lean distribution. As a second recommendation the authors consider to investigate about the Lean Enterprise Model (LEM) methodology (Negrão et al., 2016), in order to measure and improve the SCM performance related to lean philosophy. In addition to that, it is recommended to encourage the managers to expand their vision from isolated areas, to integrate the SCM to the lean concepts as an interoperable system, and, furthermore, to be more competitive in the global market environment.

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